

AP20 Rec'd PCT/PTO 01 JUN 2006

SCOPE OF CLAIMS

1. (Amended) A multibeam transmitting/receiving apparatus for receiving uplink reception signals using a plurality of antennas and controlling the directivities of downlink transmission signals transmitted from the antennas based on the strength of the reception signals, wherein delay
5 profiles for respective preset beams are generated, and if different delay profiles having the same path timing as the path timing of a delay profile with respect to which a maximum reception power level has been detected, then the directivities of the downlink transmission signals are determined based on reception antenna weights used for beams corresponding to two delay
10 profiles from which the path timing has been detected and reception power levels obtained correspondingly to said path timings.

2. (Amended) A multibeam transmitting/receiving apparatus for receiving uplink reception signals using a plurality of antennas and controlling the directivities of downlink transmission signals transmitted from the antennas based on the strength of the reception signals, said apparatus
5 comprising:

a searcher for generating delay profiles for respective preset beams using the reception signals, detecting path timings of a plurality of multipaths from the generated delay profiles for the respective beams, and outputting the detected path timings and beam numbers with respect to which the path
10 timing is detected;

a reception multibeam controller for outputting reception antenna weights corresponding to the beam numbers indicated from said searcher,

a plurality of signal processing means for measuring and outputting reception signal power levels of the signals obtained by weighting and
15 combining the reception signals which have been delayed by a given time based on the path timings set by said searcher, using the reception antenna weights indicated from said reception multibeam controller;

a transmission antenna weight generator for detecting a maximum reception signal power level from the reception signal power levels output
20 from said plurality of signal processing means, and if the same path timing as the path timing set in a first signal processing means in which the maximum reception signal power level is obtained is set in another signal processing means, generating transmission antenna weights used for the transmission signals based on the reception power level of said first signal
25 processing means, the reception power level of a second signal processing means in which the same path timing as the path timing set in said first signal processing means is set, and reception antenna weights set in said first and second signal processing means; and

a transmission beam former for weighting and combining the
30 transmission signals using the transmission antenna weights generated by said transmission antenna weight generator.

3. (Amended) A multibeam transmitting/receiving apparatus for receiving uplink reception signals using a plurality of antennas and controlling the directivities of downlink transmission signals transmitted from the antennas based on the strength of the reception signals, said apparatus
5 comprising:

a searcher for generating delay profiles for respective preset beams

using the reception signals, detecting the path timings of a plurality of multipaths from the generated delay profiles for the respective beams, and outputting the detected path timings, beam numbers with respect to which
10 the path timing is detected, and reception power levels for respective fingers obtained when the path timings are detected;

a reception multibeam controller for outputting reception antenna weights corresponding to the beam numbers indicated from said searcher,

a plurality of signal processing means for weighting and combining the
15 reception signals which have been delayed by a given time based on the path timings set by said searcher, using the reception antenna weights indicated from said reception multibeam controller;

a transmission antenna weight generator for detecting a maximum reception signal power level from the reception signal power levels for
20 respective fingers indicated from said searcher, and if the same path timing as the path timing set in a first finger in which the maximum reception signal power level is obtained is set in another finger, generating transmission antenna weights used for the transmission signals based on the reception power level of said first finger, the reception power level of a second finger in
25 which the same path timing as the path timing set in said first finger is set, and reception antenna weights set in said first and second fingers; and

a transmission beam former for weighting and combining the transmission signals using the transmission antenna weights generated by said transmission antenna weight generator.

30
4. (Amended) A multibeam transmitting/receiving apparatus according to claim 2 or 3, wherein said transmission antenna weight generator

generates transmission antenna weights using the angle of direction of a preset beam corresponding to the beam number, the number of linearly-aligned elements of said plurality of antennas, and the distance between the elements .

5. (Deleted)

6. (Amended) A multibeam transmitting/receiving method of receiving uplink reception signals using a plurality of antennas and controlling the directivities of downlink transmission signals transmitted from the antennas based on the strength of the reception signals, said method comprising the steps of:

generating delay profiles and path timings for respective preset beams;

performing signal reception processing based on the path timings for respective delay profiles;

10 detecting different delay profiles having the same path timing as the path timing of a delay profile with respect to which a maximum reception power level has been detected in the signal reception processing performed;

if different delay profiles are detected that have the same path timing as the path timing of a delay profile with respect to which the maximum reception power level has been detected, determining the directivities of downlink transmission signals based on reception antenna weights used for the beams corresponding to two delay profiles from which the path timing has been detected and reception power levels obtained correspondingly to said path timings.

20

7. (Amended) A multibeam transmitting/receiving method of receiving uplink reception signals using plurality of antennas and controlling the directivities of downlink transmission signals transmitted from the antennas based on the strength of the reception signals, said method comprising the steps of:

generating delay profiles for respective preset beams using the reception signals, and detecting path timings of a plurality of multipaths from the generated delay profiles for respective preset beams;

weighting and combining the reception signals which have been delayed by a given time for each path timing, using reception antenna weights corresponding to beams in which said path timings are detected, and measuring reception signal power levels of the weighted and combined signals;

detecting a maximum reception signal power level from the measured reception signal power levels ;

determining whether a second beam having the same path timing as the path timing set in a first beam with respect to which the maximum reception signal power is obtained is present or not ;

if a second beam having the same path timing as the path timing set in the first beam is present, generating transmission antenna weights used for the transmission signals based on the reception power level of said first beam, the reception power level of said second beam, and reception antenna weights set correspondingly to said first and second beams; and

weighting and combining the transmission signals using the generated transmission antenna weights.

8. (Amended) A multibeam transmitting/receiving method of receiving uplink reception signals using a plurality of antennas and controlling the directivities of downlink transmission signals transmitted from the antennas based on the strength of the reception signals, said method comprising the steps of:

generating delay profiles for respective preset beams using the reception signals, and detecting path timings of a plurality of multipaths from the generated delay profiles for respective beams;

weighting and combining the reception signals which have been delayed by a given time based on the path timing, using reception antenna weights corresponding to beams in which said path timings are detected;

detecting a maximum reception signal power level from a plurality of reception signal power levels for respective fingers obtained when path timings are detected from the generated delay profiles for respective beams;

determining whether the same path timing as the path timing set in a first finger with respect to which the maximum reception signal power level is obtained is present or not in another finger;

if the same path timing as the path timing set in said first finger is set in another finger, generating transmission antenna weights used for the transmission signals based on the reception power level of said first finger, the reception power level of a second finger in which the same path timing as the path timing set in said first finger is set, and reception antenna weights set to said first and second fingers; and

weighting and combining the transmission signals using the generated transmission antenna weights.

9. (Amended) A multibeam transmitting/receiving method according to claim 7 or 8, wherein said transmission antenna weight generator generates transmission antenna weights using the angle of direction of a preset beam corresponding to the beam number, the number of linearly-aligned elements of said plurality of antennas, and the distance between the elements.

10. (Deleted)